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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/621,247

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Kazimierz J. Wikiel

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EXAMINER

WILKINS III, HARRY D

ART UNIT

PAPER NUMBER

1742

DATE MAILED: 11/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/621,247	<b>Applicant(s)</b> WIKIEL ET AL.	
	<b>Examiner</b> Harry D. Wilkins, III	<b>Art Unit</b> 1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 November 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-55 is/are pending in the application.
- 4a) Of the above claim(s) 4-15, 18, 25, 26, 31 and 45-47 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 16, 17, 19-24, 27-30, 32-44 and 48-55 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Status*

1. The rejection of claims under 35 USC 103(a) based on Richards et al and Lewis et al has been withdrawn in view of Applicant's remarks regarding the lack of the teachings asserted by the Examiner within the disclosure of Lewis et al.
2. Because of the withdrawal of the previous rejection grounds, prosecution is being reopened for consideration of new rejection grounds.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1-3, 16, 17, 19-24 and 53 rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al ("Optimisation of a neural network model for calibration of voltammetric data") in view of Graham et al (US 6,365,033).

Richards et al teach (see abstract and "2. Experimental") a method including the steps of obtaining a sample set, wherein each sample includes an electrolyte solution of a known composition, obtaining an electroanalytical (dual pulse staircase voltammetry) response for each of the samples to produce an electroanalytical response data set, obtaining a training set that included the sample set and corresponding response data set, analyzing the training set using decomposition (PCA) and multivariate regression

Art Unit: 1742

(PCR, PLS) and validating the training data set to produce a predictive data set for a calibration model.

The method of Richards et al relates to calibration of voltammetric data of a mixture of ethanol, fructose and glucose, not to an electroplating bath.

However, it has been well documented that voltammetric response had been used to determine composition of copper electroplating baths. Graham et al describe (see abstract, figures 2 and 9 and cols. 5-6) creating a calibration data set to process results from a voltammographic measurement of complex copper electroplating solutions.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the method of Richards et al to calibrate voltammetric data of other solutions, such as the conventional copper electroplating bath voltammetric response. As evidenced by Graham et al, one of ordinary skill in the art would have had a reasonable expectation of successfully applying the neural network of Richards et al to a complex electroplating bath containing various constituents at significantly different compositions and which electrochemically interact with each other.

Regarding claim 16 and 17, Richards et al uses (see figure 3) a DOE routine with a multicomponent-multilevel linear orthogonal array.

Regarding claims 19 and 20, Richards et al teach (see page 36) using DPSV (dual pulse staircase voltammetry).

Regarding claim 21, Richards et al teach (see figure 3) using multiple data points.

Art Unit: 1742

Regarding claims 22 and 23, Richards et al teach (see figure 3) using a combination of multiple portions of a complete electroanalytical response using multiple independent responses at various concentrations.

Regarding claim 53, although not expressly taught by Richards et al, one of ordinary skill in the art would have found it obvious to have applied the predictive data set by (b1) obtaining an unknown sample set, (b2) obtaining the electroanalytical response of the unknown samples, (b3) preprocessing the data set to be entered into the predictive data set and (b4) applying the predictive calibration model to determine the concentration in the unknown sample.

5. Claims 27-44, 48, 49, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al in view of Graham et al (US 6,365,033) as applied above to claim 1 and further in view of Applicant's admission of prior art.

The teachings of Richards et al are described above.

Richards et al teach steps (a), (b), (c), (d), (e), (g), (i) and (j).

Thus, Richards et al fail to teach the two steps of detecting and eliminating outliers with the response data and training sets.

However, Applicant admits as prior art (see paragraph 47 of PG-Pub 2005/0183958) that detection and elimination of outliers in statistical data sets was a known technique in the prior art to control errors in the calibration.

Therefore, it would have been obvious to one of ordinary skill in the art to have added a step of detection and elimination of outliers in the statistical data sets of Richards et al for the purpose of controlling errors in the calibration.

Regarding claims 38 and 39, Applicant admits as prior art (see paragraphs 88-89 of PG-Pub 2005/0183958) that an autoscaling process known as unit variance was known for a desired purpose. Therefore, it would have been obvious to one of ordinary skill in the art to have used the conventional autoscaling process for the known purpose of enhancing data point variation.

Regarding claims 40 and 48, Applicant admits (see paragraphs 101-104 and 183 of PG-Pub 2005/0183958) that SIMCA and  $F^C$ -ratio analysis were known methods of outlier detection. Therefore, it would have been obvious to one of ordinary skill in the art to have applied the conventional outlier detection schemes in order to enhance data accuracy.

Regarding claims 42-44, Applicant admits as prior art (see paragraph 172 of PG-Pub 2005/0183958) that PRESS (prediction residual error sum of squares) was a known method of determining the optimal number of factors for calibration. Applicant further admits that PCR and PLS were the typical regression methods to determine the self-predicted concentrations.

Therefore, it would have been obvious to one of ordinary skill in the art to have used the conventional PRESS method in order to determine the optimal number of factors for calibration. It further would have been obvious to one of ordinary skill in the art to have used the conventional PCR or PLS regression methods to determine the self-predicted concentrations because of their known advantages in the art.

Regarding claims 54 and 55, Richards et al do not teach step (b), namely obtaining a secondary sample set, obtaining the electroanalytical response for the

Art Unit: 1742

secondary sample set and using a direct standardization technique to obtain a secondary-to-primary response data set. However, Applicant admits (see paragraphs 42 and 209 of PG/Pub 2005/0183958) that direct standardization techniques were known in the art for allowing a primary calibration model to be transferred. Therefore, it would have been obvious to one of ordinary skill in the art to have applied a secondary sample set with the electroanalytical results of the secondary sample set to create a secondary-to-primary transformation data set by a direct standardization technique in order to perform the prediction at a later time.

6. Claims 50-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richards et al in view of Graham et al (US 6,365,033) and Applicant's admission of prior art as applied to claim 27 and further in view of Schneider.

The teachings of Richards et al and Applicant's admission are described above.

However, Richards et al and Applicant's admission do not teach internal validation by cross validation.

Schneider teaches several methods of cross validation as model evaluation methods. The cross validation method was an internal process.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the cross validation models taught by Schneider to ensure that the model developed by the neural network of Richards et al was producing an adequate prediction set.

Regarding claim 51, this claim corresponds to the "Leave-one-out cross validation" method of Schneider.

Art Unit: 1742

Regarding claim 52, this claim corresponds to the "holdout" method of Schneider.

***Response to Arguments***


7. Applicant's arguments with respect to claims 1 and 53 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D. Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-F 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Harry D Wilkins, III  
Primary Examiner  
Art Unit 1742

hdw